

Returning To A Native Backyard

An Honors Thesis (HONR 499)

by

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Thesis Advisor

Lisa Dunaway

A handwritten signature in black ink, reading "Lisa Dunaway". The signature is fluid and cursive, with the first name "Lisa" and last name "Dunaway" clearly distinguishable.

**Ball State University
Muncie, Indiana**

April 2014

Expected Date of Graduation

May 2014

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Abstract

Through various economic booms and mass migration as well as deliberate introduction of ornamental plants, suburban neighborhoods are known for their “cookie-cutter” landscapes and high standards of garden grooming. Recently, there has been increased interest in the health of such strict landscaping to the yards, the living creatures in each, and the neighborhood ecosystem overall. This thesis begins with a discussion of the difference between native and invasive plants, what their involvement means to a region, and what it takes to increase the health of an average family’s backyard through methods suggested in *Bringing Nature Home* by Douglas W. Tallamy. Finally, this thesis personally addresses methods to a healthier suburban backyard through extraction of invasives and how minimal changes have a positive impact on the neighborhood ecosystem.

Acknowledgements

I want to thank Lisa Dunaway for shedding the initial light on the situation of invasive versus native plants within her Environmental Planning course and for agreeing to be my thesis advisor thereafter. Without her knowledge and care for the topic, I would have never known of the issue that is becoming more of a problem than most yard-owners realize. I also want to thank Dr. John Vann for offering his personal experiences and advice with combating invasive species in his own backyard; a constant battle that is all too real for he and his wife! I owe a huge thanks to Kevin Tunesvick who kindly identified the plant species for me over a few smartphone-captured photos of leaves. My pup, Cody, for chewing up all the bundled sticks before chasing all the squirrels away from my worksite. Finally, I would like to thank Douglas Tallamy who does not know me at all but wrote *Bringing Nature Home* which inspired me to pursue this project.

Returning to a Native Backyard

Health is the essential, all-encompassing factor in a human life. Without health, life cannot continue. While it is instinctual for humans to maintain and continually improve personal health, the well being of other living organisms is often overlooked. Throughout this report, the importance of a healthy ecosystem is addressed and emphasized. I also discuss the background information of what an average suburban system is and why it has been unhealthy for the past half century. At the most primary level, any system cannot sustain itself if there is unbalance. Humans are a heavy factor in the Earth's infinite systems and creating more unbalance than we realize. Awareness of systems and methods to improve the health of a system will aid to rebalance what has been thrown off. Aside from awareness, actions must be taken which is why I focused on actually working outside in an unbalanced setting before writing about it. My report has two general pieces; the first being an introduction and discussion of landscape ecology, habitat fragmentation and the difference between invasive and native plant species as well as explanation of monocultures and carbon sequestration. Some of these topics were brought to my attention through Dr. Douglas Tallamy's book, "Bringing Nature Home: How You Can Sustain Wildlife with Native Plants" and much of my project's research is driven through Tallamy's findings. The second is composed of my personal experiences and recollections from working in my own backyard in suburban Chicagoland with the purpose of relating and emphasizing my lessons learned to any yard setting.

Before anything else, the definition of landscape ecology is an important factor to establish. According to Monica Turner at University of Wisconsin, Madison, landscape ecology "...focuses on the reciprocal interactions between spatial pattern and ecological processes, and it is well integrated with ecology" (Turner). It is also important to look at how the definition is incorporated into daily life. For instance, the definition refers to reciprocal interactions which relate to the web of interdependence. The web of interdependence represents the theory that everything in an ecosystem is tied together and works as a team. Often this theory is introduced to elementary students and can be most effectively expressed in a simple visual such as Image 1.

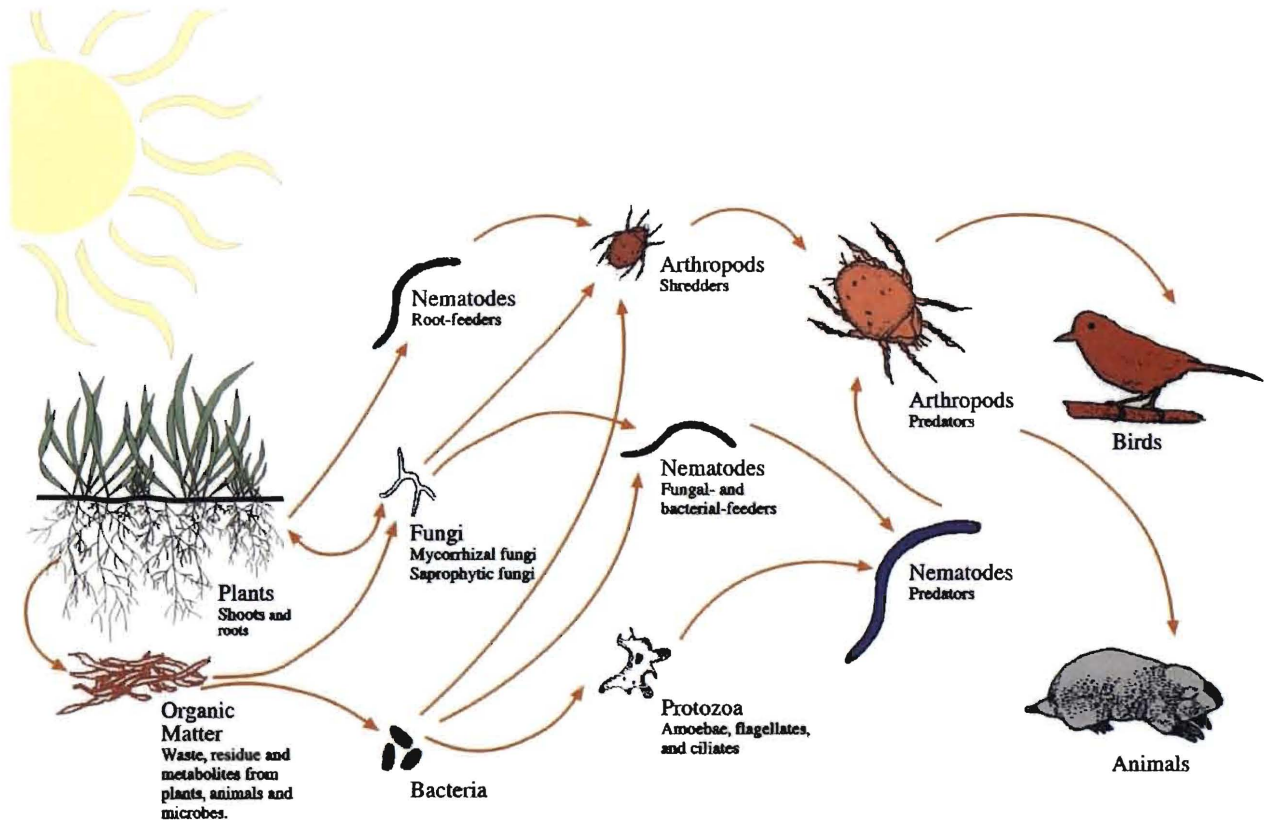


Image 1: Web of interdependence; all species within a web rely on each other and create a cyclical exchange of nutrients and life. Found at: <http://goodshare.org/wp/humility-quiz-how-humble-are-you/>

There are infinite webs within the world but most are framed within ecosystems. Even within an ecosystem, though, there could be hundreds of webs of interdependence with varying complexities. These complexities are known as biodiversity which is essential for a healthy ecosystem. Biodiversity can be described as stability, productivity, and biochemical processes within an ecosystem. Each factor is essential to maintaining sustainability of an ecosystem. To keep life going, there cannot be an unbalanced component of the web. For instance, if there are too many deer and not enough wolves to hunt them in a ecosystem, the area might become barren of wild shrubs which in turn will decrease the amount of birds that like the seeds and berries from the shrubs. This might cause an increase in insects such as mosquitoes and other disease-transferring carriers, especially between the increased amount of deer. Biodiversity of an ecosystem also serves as an immune system for what Tallamy calls, “alien invaders” (Tallamy, 44). A diverse ecosystem is less susceptible because there are more available niches and inter-web competition between organisms; if one organism’s population is decreased by an alien invader, there is a competing organism that will thrive and take its place, sustaining the web’s balance.

The web of interdependence that backyard observers might be most interested in is one that includes clean air and water, minimal soil erosion and healthy existing soil horizons, vegetation such as grass, shrubs, and trees, and creatures such as insects and mammals (including people). Thanks to rapid social and industrial development along with exponential population growth, humans can be found in almost every web of interdependence. Since

humans have such a role in ecosystems, it is important to note their impact.

The United States Environmental Protection Agency defines carbon sequestration as part of a set (along with carbon dioxide capture (CCS)) of “technologies that can greatly reduce CO₂ emissions from new and existing coal--and gas--fired power plants and large industrial sources” (Carbon). While at the national level, CCS deals with major emitting sources such as coal burning power plants, Tallamy introduces carbon sequestration within his book by noting how environmentally harmful it is to mow a lawn; something every homeowner with a lawn (or two) experiences weekly during the warm seasons. He writes, “On average, mowing your lawn for one hour produces as much pollution as driving 650 miles” (Tallamy, 136). Relatively small scale emissions such as this can be hard to consider, especially when it can easily be said that there are “bigger fish to fry” within the climate change issue. But, calculating personal carbon footprints has become more common in recent years. There are websites such as nature.org and even the U.S. EPA that offer carbon footprint calculators. Typically, natural, wild, flora and vegetation can serve as a carbon sink; they take in carbon dioxide and regulate air quality. When humans developed neighborhoods such as “cookie-cutter” suburban dwellings, each home received a nice, big yard that was finely landscaped. With the new standard of landscaping came short, clean grass and perfectly manicured, ornamental plants.

When it comes to carbon emissions, trees tend to bear the burden of cleaning the atmosphere because they are the most well-known and commonly understood form of carbon sequestration. Carbon sequestration can be simply described as the process of taking carbon out of the atmosphere and storing it in a reservoir. Trees take in carbon dioxide and produce oxygen; it is not a new revelation that without trees, there would likely be no life on earth. Despite their heavy responsibility, trees are not the only organism that stores carbon. Any plant species that relies on carbon dioxide to survive can be a storage unit. Typically, a mass of trees, bushes, grasses, and other plants can be seen as a reliable carbon sequester because there are so many organisms storing carbon dioxide and producing oxygen for the system. A mass of vegetation is also known as a carbon sink. It is important to point out that carbon sinks and carbon sequestration is not limited to vegetation; ocean circulations can also sequester carbon. For the purposes of suburban lawns, though, carbon sequestration may occur less efficiently than it used to because neighborhood developments have changed the circumstances. For instance, before a two story house was built and a quarter acre of lawn laid down, the vegetation setting was quite different. Where there might have been deep-rooted trees and bushes, there is a driveway. Where there might have been strong prairie grasses, there is a swing set or a pool. What is left after a family moves in are the landscaped bushes, short-rooted lawns, and ornamental vegetation such as seasonal flowers and invasive species. Root systems and the strength of native species in an area are key to efficient carbon sequestration. Not to say invasive species cannot aid in sequestration, but their root systems are most likely less strong in foreign soil than if the roots were established on respectively native ground. Plus, when natives and invasives compete for space or sunshine, there is even less efficiency for sequestration because both species are likely to be weaker overall.

Other than the upkeep of a suburban lawn, their toxicity can also be sourced from other considerations. Cookie-cutter neighborhoods, as mentioned, are themselves a major issue when it comes to the web of interdependence. Specifically, neighborhoods are intrusions to pre-existing habitats and are inhibitors of the ecosystem that was there before humans moved into

town; this issue can be considered as habitat fragmentation. A habitat is known for having four main characteristics: food, cover, water, and space. There are three common categories of habitats: patches, which are areas of similar ecosystems that are left over after disturbances; corridors, connections between patches; a matrix which is simply the remainder of landscape. Small patches pose higher risks for the ecosystem than large patches. Large patches give the opportunity for widespread and varied reproduction while small patches may have higher amounts of inbreeding and therefore more susceptibility to illness and death. Large patches also have higher variety of species which strengthens the web of interdependence and maintains sustainability of both the ecosystem and the species involved. While the visual below may appear mostly green and vegetated, with large patches and corridors, it is not a healthy situation for the habitats involved. For instance, the patch is extremely far from any other and the corridor looks to be equally isolated. This causes animals to emigrate and meander through the matrix, increasing the risk on themselves. Tallamy may refer to the small patch in the visual as a habitat island in which the species in the vegetated patch are basically marooned. Furthermore, Tallamy describes some habitat islands as habitat “sinks” which he explains are “isolated locals that constantly lose individuals to death and emigration” (Tallamy, 30). Although extinction is an important issue, it is necessary to point out that it does not happen overnight but with so much habitat fragmentation occurring, humans are speeding up the extinction process.



Image 2: Aerial example of patch, corridor, and matrix, the three common categories of habitats. Found on: <http://nac.unl.edu/buffers/using/landscape.html>

The interaction between habitat fragmentation and plant species may not be immediately apparent but is an important dynamic in an ecosystem. Tallamy offers a few points of improvement on existing suburban matrices. First of all, he unveils a couple interesting statistics: “...suburbia in some areas of the country has increased 5090 percent since 1960” and “...we have paved at least 4 million linear miles of public roads in this country” without including parking lots, driveways, and other paved surfaces (Tallamy, 32). Nature preserves of corridors and patches are helpful but only to a point; matrices can still grow around them and further isolate habitat islands. Tallamy suggests suburban homeowners take on the challenge of creating a more sustainable neighborhood through reducing areas of lawns, begin transitioning

from alien ornamental vegetation to native plant species, and strive for a balanced troposystem (a term based off of *trophic level* which relates to the feeding and nutrition of a web of interdependence).

There are many different definitions and description of native plant species but overall, there are two most common points that are known about them. First of all, native plants, are defined as those that existed without human introduction (Lady Bird Johnson). Also, native species have “generally adapted and evolved with the competing species, predators, and diseases of an area over many thousands of years” (Ecosystem). Natives also have an established ecological balance with their fellow members of the ecosystem. A species’ nativeness can overlap or be exclusive to its region. Native plants are strongest in their originating region, can most easily combat diseases and competitors, and--most importantly--play a major role in the health of the ecosystem. They have wet and dry soil tolerance, depending on their region’s climate, which promotes sustainability and reproduction. General adaption to the region’s climate is a major factor that natives have mastered as well. Finally, native plants attract the most diversity of wildlife; they are a food source for more species than invasives are and provide many other services for the ecosystem overall.

Invasive plants are a whole different story, unfortunately. When placed outside their originating region, they are boundlessly unhealthy to the ecosystem. They have a hard time adapting to the different climate so adjustments to wet or dry soil may have caused them to be more hearty and aggressive species. Native species often do not have a chance competing with invasives because invasives may be more aggressive. Soil may actually be affected by invasive plant species because the availability of surface and groundwater levels may change, depending on the type of invasive. This in turn can cause low soil biodiversity such as grubs, worms, and other soil-dwellers; eventually leaving soil unhealthy and starving for nutrition. With lack of soil nutrients, soils can become dry which can be represented through the plants. For instance, there are increased risks of wildfires because the soil is too dry and deprived of nutrients to keep the plants hydrated and healthy. Invasive species do not contribute to the above-ground food supply as natives do; most insects are specialists. Meaning, they only eat a few plant lineages. When a native is replaced by an invasive in the ecosystem, insects have immediately lost their food source and die off. Endangered species are further threatened by invasive species because their common food source--a native plant--has been replaced by an invasive so the endangered creature has to either migrate to search for a substantial food source or die off.

Within ecology, the debate of whether invasive species actually do harm in an environment is ongoing and controversial among specialists. Some people, such as Tallamy and myself, support the belief that non-native species are detrimental to an ecosystem, no matter what. Invasives are often introduced by humans and therefore are not beneficial to the environment, which can be represented through the decline of insects, birds, and soil health. Supporters of invasive species claim that the variety of plants aids the ecosystem, offering different option for birds and non-specialist insects. This viewpoint would be valid if the birds and insects were able to adapt as quickly as humans but, in reality, most insects are specialists and it would take centuries for their digestive systems to adapt. Concerning the debate, research was held at Penn State by Tomás Carlo; “Invasive plants can create positive ecological change” was released in February of 2011. Written to assist environmental resource

managers with ecosystem maintenance, the report states the following:

“After comparing [their] data with similar data from urban, agricultural, and forested areas, they determined that the abundance of honeysuckle predicted the numbers and diversity of birds within the region and even beyond the region. That is, the honeysuckle and bird communities had formed a relationship known as mutualism -- a term that describes how two or more species interact by benefiting mutually from each other's existence” (Carlo).

The report also noted that migratory birds might benefit from invasive species. For instance, Carlo states, “...scientists should conclude that, while some invasive, human-introduced plants are definitely problematic, others could serve to restore ecological balance by providing essential food resources to native migratory birds that populate areas affected by humans.” While his reasoning is valid, Carlos does not mention that migratory birds instinctually migrated before humans entered the system. While fruit-eating birds received dietary variety through their migration patterns, variety is more readily available through human-introduced invasive species and migration patterns may change. There have not been official studies on this theory yet but the bottom line is that dietary variety does not rely on invasive species. While the debate continues and research ceases to halt, every lawn owner or ecologist may hold their own opinion on the matter. As stated, I believe that invasives harm the ecology and create struggle for the rest of the system. Without invasives in the system, balance can be achieved, much as if humans never attempted to introduce invasive species.

Soil health and water management relate to more than just the plants that are involved, regardless of their nativity. While native plants retain water and manage it better within the soil than invasives, the bigger issue with water loss often lies with the lawn. The grass of big, suburban lawns has short, shallow root systems which hardly retain water as well as wild grasses. Since the root systems do not hold water very well, rainwater practically glides directly off of lawns and into sidewalks, streets, and stormwater runoff systems. Tallamy describes lawns as sterile “alien grasses” and estimates that lawns make up as much as 62,500 square miles of converted land in the United States (Tallamy, 32). To combat wasted water and avoid increased water runoff, planting native species and wild grasses is the easiest option. If more root systems are able to take in the water, the ecosystem will thrive from there. As shown in Image 3, grass typically used for landscaped lawns has the shortest root system (located on the far left); it is almost laughable compared to the other, stronger, root systems.

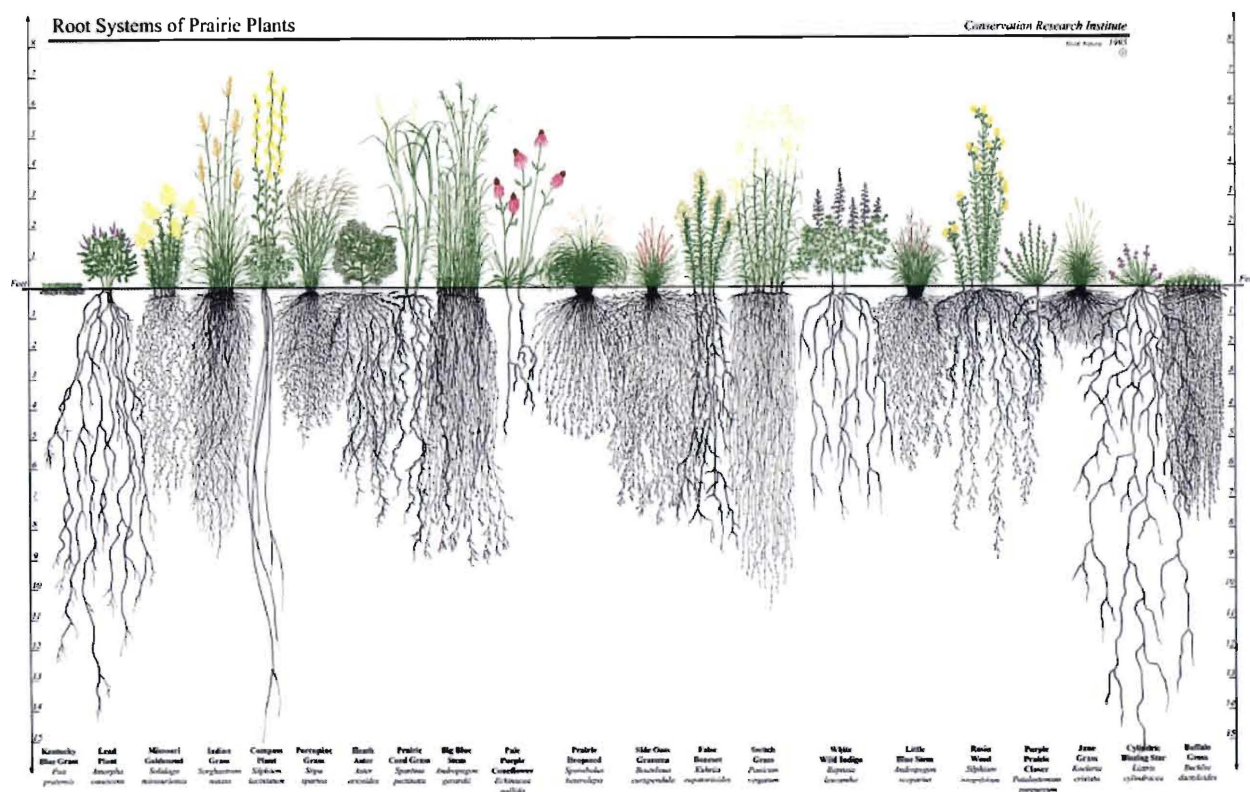


Image 3: Root systems of varied grasses, shrubs, and prairie plants. Located at:
http://www.nrcs.usda.gov/wps/portal/nrcs/detail/il/plantsanimals/?cid=nrcs141p2_030726

Along with strong root systems, variety of native species is a key factor in a healthy ecosystem. Monoculture is the most commonly-known term for an agriculture method in which one type of crop or plant is planted on a large-scale for a long period of time. Many ecologists believe that monocultures are ruining nutrient supply, permanently damaging overall soil health, and hindering future food supplies. For instance, corn and soy farmers dedicate their entire field to alternating between the two crops; for a few years, only corn will be grown, immediately followed by a few years of only soy, and so on. The concern with this method is that while the farmers overturn the soil between crops, the soil is ultimately starved of nutrients because there is little to no variety. Chemicals used to repel insects or disease from the crops also make a major difference and have a lasting negative impact. Unfortunately, monocultures need the chemicals because the crops are extremely susceptible to disease and the farmer's chances of losing the whole crop are increased. For instance, if a patch of soy contracts a deadly strain that applied chemicals cannot protect against, the whole crop is more likely to die because there are not any other plants in between the soy to help defend the spreading. Outside of farming, monoculture can also apply to forests, backyards, or even gardens. A forest with only native pine trees and a garden with only daffodils can both be considered a monoculture. Many suburban lawns are considered a monoculture because only one type of grass is grown over the whole area for a long period of time. Intrusions of weeds or other grass species would change the situation. Permaculture, a fairly new term, is considered the opposite of monoculture. Officially, permaculture is commonly known as the development of agricultural ecosystems designed to be sustainable and self sufficient. While permaculture is a practice that is purposely

designed, its ecologic health benefits can be mirrored through naturally-occurring examples. For instance, a forest composed of only pine trees is highly susceptible to disease, forest fires, and insect infestations. Ultimately, it is not destined for longevity because it is a one-sided system. If more tree species were introduced into the same forest, though, it would become stronger through the added variety. If a pine-loving fungus was threatening the species, the pines would have a better chance of survival because there might be cottonwood and aspen trees in between and intermixed. With less chances of spreading to the pine, the fungus would die out and the forest would not lose the pine species. In a garden setting, this methodology works the same way which is why permaculture is becoming a rapidly popular choice for vegetable gardens. Even more so, many gardeners believe that different vegetables help each other by providing shade, protection, and soil nutrients in a permaculture setting, as opposed to a monoculture or segregated garden. When considered in a native vs. invasive species situation, it may seem that a mix between the two would be healthy for the ecosystem but that is not the case. Any invasive species can harm an ecosystem because of the web of interdependence; invasive species cut off native plants from the specialized insects and bird species that rely on each other. So, a backyard with a variety of native plants and no inclusion of invasives is ideal and would best represent a permaculture approach to gardening and landscaping.

With an established understanding of landscape ecology and the importance of healthy habitats, adjusting a suburban backyard becomes an option for any homeowner. Images 4 through 6 show my family's home in Palatine, Illinois, a northwest suburb of Chicago. My mother has received many compliments over how beautiful our front lawn is since we moved in 20 years ago (see Image 4). Before we lived there, a family moved into the 2,000 square foot house as it was freshly built around 1970. The house is located in a fairly dense suburban neighborhood and we own slightly less than a quarter acre, as shown by the aerial image (see Image 5). We have one of the largest backyards in the neighborhood (the largest yard is currently occupied by an in-ground pool) with much of it occupied by trees and large shrubs. My neighborhood is highly populated, thanks to the development boom in the 1970s. Before then, it was an apple orchard, owned by one farmer who eventually sold the land for the new homes and highways. My neighborhood is located off one major road, Hicks Road, but is furthermore surrounded by other neighborhoods, strip malls, and grocery stores. Our area has sidewalks, cul de sacs, and backs up to a man-made reservoir which separates the houses from Hamilton Park's soccer fields (see Image 6). Aerial visuals of the neighborhood point out the issue of habitat fragmentation. While the visual does not include them, there are a few miles of nationally preserved forest area (with a convenient bike path cutting through...) to the northwest but the interesting issue is that there are barely any corridors to link them and no other patches to connect to. Those preserved areas are the perfect example of islands that Tallamy mentions. A slight corridor is included, though, in Image 6; I have boxed it. The aerial was taken during fall so the vegetation is sparse but during blooming months, the vegetation is fairly lush. Often there are deer, coyotes, and small mammals such as raccoons, skunks, and rabbits. Not to mention birds. I am hesitant to mention the insects because for the past five summers, our neighborhood has been sprayed with mosquito repellent on a nightly basis during the hot August evenings; I can only imagine how detrimental the spray is to the insects but it is safe to assume the population has been decreasing rapidly. The water reservoir, as shown in Image 6, serves as a partial patch for wildlife because, other than the service road that leads to the pump house,

there is not much human involvement in that area. The water reservoir is also home to the same species as the adjacent corridor which is helpful to their habitat but not especially beneficial to our neighborhood. Since there is little separation between the residential area and patch/corridor, the animals often scavenge for food. Raccoons, skunks, woodchucks, and even coyotes have wound up crossing our property countless times. Coyotes, while they are most likely common in other--possibly more rural--areas, are frowned upon in my neighborhoods. With children and small dogs populating the area, coyotes pose as a major safety hazard. A defensive mother coyote attacked my 75-pound dog a few years ago. If Palatine had more than a few patches and skimpy corridors, coyotes and other scavengers would not be such an issue. Alas, making a change would be close to impossible at this point, seeing as the whole town has been developed for over 30 years.



Image 4: Example of suburban home with landscaped front yard and sidewalk. 943 Fairway Drive, Palatine, IL.
Source: Google Maps



Image 5: Aerial view of suburban home and backyard area. 943 Fairway Drive, Palatine, IL. Source: Google Maps (edited by user).



Image 6: Map view including Hamilton Park, water reservoir, and surrounding neighborhoods representing corridor, patch, and matrix categories. Source: Google Maps (edited by user).

While it may seem arbitrary to some, native plant species might be the next best solution to my neighborhood's fragmentation issue. Currently, there are dozens of homes just like mine that are as equally landscaped. The area is as barren of nutrition and health to the ecosystem as a desert. Scavengers are resorting to sniff out our trash because the ecosystem's web of interdependence is unbalanced. If my neighborhood was to replace invasive plants with natives, the story would change completely within five years or so ((Perma)Culture). Once natives regain dominance in the ecosystem, insect diversity increases and hopes for a balanced web are increased. Tallamy certainly vouches for insects by reiterating their importance to an

ecosystem:

“In a balanced community, with rare exceptions, no one member of the food chain dominates another, and if one species in an essentially sound system does start to run rampant, it is soon brought back into equilibrium by the other members of the community...If you carefully inspect individual leaves in a forest, you will find that a small portion of most of the have, in fact, been eaten by insects; but the overall effect is still one of beauty, not destruction” (Tallamy, 95).

With Tallamy’s message in mind, I decided to tackle my family’s backyard. I may have been a bit naive and over-confident towards the physical labor of the project but my unwavering goal was a maintained, despite the amount of work. While surveying the patch of shabby shrubs and overgrown bushes in the far back of my backyard in mind, I decided to plan my project in three stages: extract all invasive species, purchase new native species, and plant them. My backyard in the spring can be seen in Image 7. It looks beautiful but looks can be deceiving; with barely any pruning or upkeep in the past 10 years and about 5 years past its climax, I was surprised that anything bloomed at all. Images 8, 9, and 10 show closer scopes of the area during June and the vegetation is certainly humming a different tune; less is blooming, the strongest bushes and shrubs are thriving while the weaker, possibly older, plants struggle. My three-stage project only became a handful when I began identifying the plant species to find out which were invasive and which were native. Not an easy task for a student who is not a botany or biology major, let alone someone who generally does not have the greenest thumb! With help, I was able to achieve identification.



Image 7: Suburban backyard in May, 2013. Seemingly healthy, the backyard’s understory is mostly dead, leaving more opportunity for thriving invasive species to grow and blossom each year.



Image 8: Suburban backyard in summer; overgrown bushes choke out ground cover and smaller shrubs.



Image 9: Half-dead bushes suffocated by thriving, overgrown, invasive bushes.



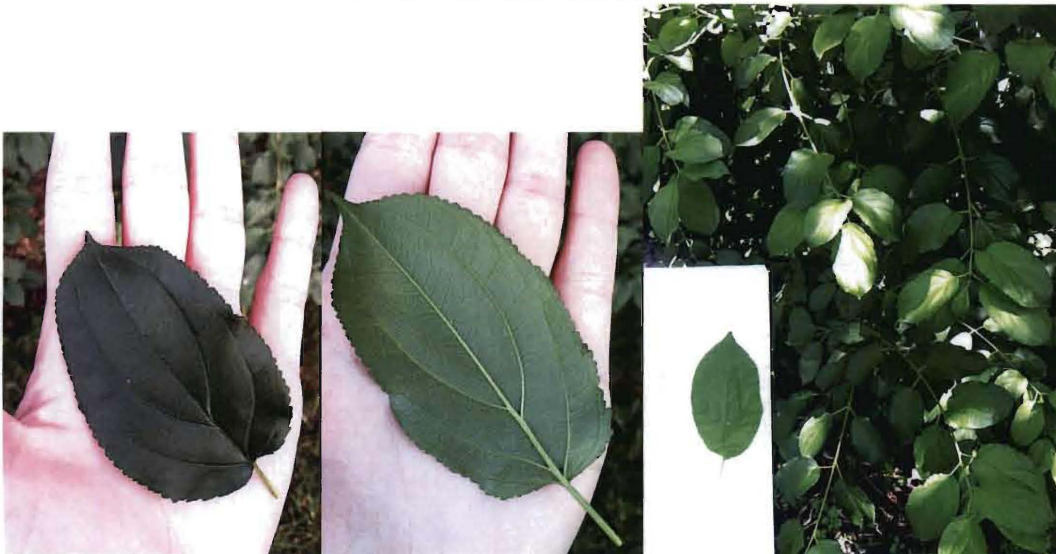
Image 10: Ground cover is sparse; bushes are half-dead from stronger, dominating bushes.

On the first morning of my project, with shears in hand, I confidently charged towards the area in the far-back of my yard with my trusty Labradoodle, Cody, happily trotting behind me. My goal was simple for the morning: identify as much as I could. Much of what I saw appeared to be the same species; there were at least a dozen bushes that all had the same leaf. So, after sorting through, I found four main species and clipped leaves from each. For the project, I wanted to solely identify the shrubs and bushes in that area mainly because I would have needed more “manpower” to extract anything larger than that, such as a full-grown tree. Once I obtained samples and took pictures, I sent the pictures to Kevin Tunesvick who expertly identified them for me. I do not have pictures of Japanese Snowball (*Viburnum plicatum*) because I already knew through previous research that that species is invasive for all regions within the United States so I began extracting that species before the rest. Unfortunately, this means I have a few clear pictures of Japanese Snowball, unlike the specific, purposeful shots of the other species. Images 11 through 21 represent the identified samples:

Burning bush (*Euonymus alatus*), Images 11-13:



Common Buckthorn 1 (*Rhamnus cathartica*), Images 14-16:



Common Buckthorn 2 (*Rhamnus cathartica*), Images 17-19:



Japanese Snowball (*Viburnum plicatum*), Images 20-21:



(Image 21 is an example of a strong, yet relatively shallow, root system of a tiny sapling I had pulled up. The Japanese Snowball leaves can be seen in the background; they have 3 main points. I have boxed some clear leaves.)

My backyard is within the Upper Midwest region which includes Illinois, Wisconsin, Michigan, Indiana, Ohio, Minnesota, Iowa, and Missouri. Within that region, there are species that are native to some states or partial states, yet invasive to others (which Common Buckthorn exemplifies). With that being said, Table 1 represents what I found to be native and invasive of

my list of identified species.

Species	Native	Invasive
Common Buckthorn	Yes	Yes (from eastern US to southern IL)
Burning Bush	Yes (certain lineages)	No
Japanese Snowball	No	Yes

Table 1

The main trouble I had with trying to identify plant species on my own was that none of the plants were blooming, flowering, or had berries on them. As I mentioned, the area was well past its peak so the area was overgrown and many of the bushes were old to the point of decrepit (as shown by bare branches, towering weeds, and struggle for sunlight in Image 22 below). So, after identifying the natives, I targeted the invasives. I focused on Japanese Snowball because it was obviously the most populated of the area. Other than Japanese Snowball, Common Buckthorn may be seen as invasive in regions from the eastern coast to Southern Illinois which does not include my backyard but may be a factor since the “normal” ecosystem has been thrown off so drastically since the neighborhood’s establishment in the 1970s.



Image 22: Over-competition for sunlight and ground space as a result of overgrowth and invasive species’ aggressiveness. Weeds and patchy grass grow over and through ground cover while small shrubs and understory continue to be choked out.

The first few days of extraction were tough but rewarding. Although the area is mostly covered throughout the day by the tall trees' shade, the summer heat was hard to work through. I started off by trimming all of the branches off of a Japanese Snowball bush so that all that was left was the stump and one or two main trunks; basically, anything with a thick enough circumference that my hedge clippers could not take down was left intact. Typically, one bush left me with a huge pile of twigs, leaves, and branches--as shown in Image 23--which I ended up bundling at the end of the day. I used bundling twine that is 100% Sisal, biodegradable and recyclable. The bundles gave me a bit of trouble, though, when it came to storing them until collection day. Palatine collects our lawn clippings, raked leaves, and bundled trimmings along with the trash on the weekly garbage day. Since I mainly did my yard work on weekends (I worked full-time in an office during the week), the bundles would often have to sit outside for three or four days. Stagnant bundles presented an issue because of the neighborhood critters; if the bundles were not elevated, squirrels, skunks, or raccoons would happily nestle in. Luckily, there were a few places in my backyard that the bundles could sit on so that they were elevated for a few days. The other issue came with the weather; summer storms soaked them and invited mold and "fun" little insects. I did not want to cover the bundles, though, because I sensed that would be a further invitation for birds and squirrels to nest. So, needless to say, when collection day came, I was eager to run my bundles out to the curb.



Image 23: Cut vegetation from Japanese Snowball bush; image used as an example of mass amount of vegetation extracted from the area.

While I was able to extract much of the Japanese Snowball, there were three stumps that would not budge, no matter how many hours I spent hacking away at them with my shovel. Those stubborn individuals were three of five originally planted bushes when the backyard was first landscaped, over 30 years prior. I would not have ever known this if it were not for the old, partially degraded twine and plastic-cloth-mix bag that the sapling was originally wrapped in. At first I marveled at these findings like an archeologist uncovering artifacts but after pulling up more broken pieces of thick twine and scraps of bags, the artifacts quickly resembled like the garbage they were. Interestingly, though, I often pulled up twine that had roots attached to them; the roots surround the old twine as they grew and were now one. A slightly humorous symbol of organic and inorganic interactions which made me chuckle in the summer heat.

The root system of the Japanese Snowball is an interesting one to point out. Although there were only five originally planted bushes, the species was the most popular in the area, with roots that ran laterally. Surely, lateral root systems are nothing new or groundbreaking, but contribute to the popularity and make a statement about aggressive invasive species. The species had most likely spread from dropped seedlings, especially when ground cover ceased to develop from increased shade from the taller vegetation. From there, the root systems monopolized the upper soil horizons and took advantage of the immediate water supply and ever-present organic layer of leaves and biodegraders (such as worms and bacteria). Despite the aggressive manner of the root systems' growth, the roots themselves of the Japanese Snowball were not especially strong. They were small in diameter (an inch at most, in general) and easily breakable. The majority of the bushes were offspring of the main five so they were smaller and weaker. A few of the offspring that I dug up were rotting so the roots instantly crumbled in my hands and stumps collapsed into dusty bits. Of the main bushes, I was only able to completely de-stump two by myself. The remaining three were still alive and very healthy so their roots and stump were beyond my strength to extract (see Image 24). I had to call for backup; once a summer my mom hires, José Sanchez, a local landscaper, to fertilize and trim the yard. Near the end of my project, I called him to help de-stump, estimating it would take about an hour (going off of the multiple hours I had already spent hacking away at them) but it took less than 10 minutes and he hauled the material away for me.



Image 24: Japanese Snowball stump; established root system and well developed, low-sitting branches. Eventually extracted professionally.

The extraction process took weeks so I became very familiar with my backyard, its soil, and its inhabitants. In June, I jotted down observances of the soil, noting that it was very healthy. Overall, my backyard's soil is a clay and sandy mix; areas that receive much sunlight have more black, clay soil as opposed to more shaded areas that have black clay mixed with

brown sandy soil. I also noticed the soil was gummy--it stuck and continued to build to the bottom of my shoes very easily--which was a sign of good moisture and nutrient retention. Scraping globs of dirt and debris from my soles became a necessary routine. I often lost my balance once one foot was inches higher than the other!

The insects I observed seemed diverse although were mainly soil-dwellers; there were hardly any insects that lived in the bushes. I saw plenty of spiders, flies that swarmed the new dirt, mosquitoes, centipedes, earwigs, *some* worms, huge grubs, and a handful of sleeping cicadas. I did not see any signs of caterpillars, butterflies, crystallises, or cocoons; I saw an occasional moth. I attribute the lack of population and diversity of insects from the overpopulation of invasives. Throughout the summer, there were barely any birds that flew near me while I worked. Of course, the backyard has many sparrows, robins, and two cardinals so there is not a bird scarcity but I noticed it was quiet around my work area. Then again, I was a pretty intrusive monster to the backyard inhabitants so I most likely caused their absence. Overall, though, I saw little habitat action within the branches I extracted. No bird nests or crystallises, as mentioned.

While Japanese Snowball ruled the area, Burning Bush and Common Buckthorn were two identified natives that seemed to be thriving fairly well. For instance, one of the Common Buckthorn bushes was practically choking out the ground cover and evergreen as well as the lower half of the tree trunk, as shown in Image 25. Despite the aggressiveness of the Japanese Snowball, it seems that the native species were putting in quite an amount of backlash to thrive.



Image 25: Overgrown native bush (Common Buckthorn) dominating space and sunlight over ground cover and evergreen shrub.

I did not disturb the natives any more than light pruning to shed light on the ground cover and evergreen shrub. Burning Bush, though, was a species I had to reconsider extracting. Some sources, such as *Invasive Plants of the Upper Midwest*, written by Elizabeth J. Czarapata, note that Burning Bush is invasive but of lesser concern. Meaning, they “do not pose major threat to well-established native plant communities” (Czarapata, 86). Other sources, such as Tallamy’s *Bringing Nature Home* suggest that Burning Bush is a native member to Midwest and Eastern Great Plains regions (Tallamy, 305). Finally, there are some sources that are

adamant that it is an invasive species. As CEO, manager, and all-knowing decision-maker of the project, I made the executive decision to leave the Burning Bush. Mainly because there are two other bushes of that species elsewhere in the yard and the two cardinals that live in them seem happy enough to have returned for five consecutive years.

Throughout July, my personal schedule began to get hectic. I was rarely home long enough to set aside whole weekends to work on my project. So for a few weeks, nothing happened. The invasives had been taken out and thrown away--except for the three stubborn stumps since I had not contacted Jose yet--and gaping holes and mounds of dirt remained as a constant reminder that my work was hardly over. When I could, I weeded the area. For a few weeks I felt like that is all I ever did; the weeds, loving the newfound sunshine, were growing very aggressively where the invasives used to shade. The invasives stumps, stubborn as always, had begun to regrow and come back with a vengeance. The site was a complete mess and is shown in Images 26 through 28.



Image 26: Mayhem: stumps left to be professionally extracted and weeds growing in newly overturned soil and vacant space.



Image 27: Stumps left, holes remain unfilled, weeds creep in.



Image 28: Rooted stump started growing back and ground cover, weeds, and understory began to fill in newly available space.

Unfortunately, weather also prolonged my progress and made everything messier. We had periods of rain followed by what I described in my notes as “brutally hot” temperatures and humidity. I tried de-stumping one of the smaller invasives at one point and almost passed out

from the heat so afterwards, I stuck to weeding on a regular basis. I also trimmed the stumps to keep regrowth at bay which definitely made completely extracting them easier. During this lull in major work, I began shopping for native species to fill the [depressingly barren] area.

When summer finally came to an end, my project was not quite at the point where I wanted. There were still holes and piles of dirt, not to mention the ever-present stumps and growing weeds. I left home and returned to school feeling unsettled, knowing my project was not where it should be. Yet I found comfort in talking with Lisa Dunaway who assured me that as the seasons change, the distribution of water and energy within a plant changes as well, so waiting until October to finish extracting would not be detrimental. For instance, leaves dry up and fall off because the plant begins to store energy and nutrients in the trunk and roots, especially after temperatures begin to drop. So, extracting the stumps would be much easier now that the water and nutrients are not above ground. With her advice in mind, I traveled back home for the week-long break, feeling determined to get native plants into the dirt.

Finding natives around Palatine was harder than I expected. Because so much of the neighborhoods are landscaped and rely on invasive ornamentals to beautify the lawns, locating a store that sold anything more than hydrangea bushes and honeysuckles was difficult. Finally, I went to The Atrium Garden Center--a company known for hiring expert gardeners and horticulturists--and purchased three small bushes: two Burning Bush and one Juddi Viburnum. Each Burning Bush is not expected to grow over seven feet tall and the Juddi Viburnum is expected to grow up to six feet. Both species can be seen in Images 29 through 33; Burning Bush is fiery red and Juddi Viburnum is red/green mix.



Image 29: Burning bush (left), Juddi Viburnum (right)

Image 30: Burning bush



Image 31: Juddi Viburnum



Image 32: Burning bush



Image 33: Completed extracting of old, invasive species and planting of new, native species (identified in Images 29-32).

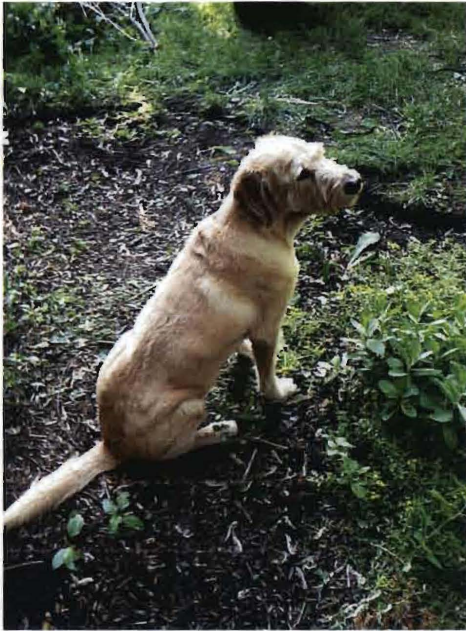
Once the natives went in the ground and got lovingly padded down with dirt, Phase I of my project was complete. Despite successfully planting three natives after extracting a dozen invasives, there is so much more that needs to be done. For instance, there are still gaping holes in the area; these do not harm nor help the ecosystem but certainly to not look aesthetically pleasing. Since I am only one human being and have limited financial resources, I am proposing future phases of my project to come back to when I can afford it. Each phase will receive an estimated \$100 and will occur over the course of 5 years.

Phase I has been completed and contributed to my thesis.

Phase II will be the introduction to wild grasses such as Switchgrass to the far back of the area, preferably against the wooden fence. This will provide an aesthetically appealing backdrop for the area and aid in water retention plus prevent flooding.

Phase III will be the introduction to native shrubs where ground cover is sparse but will most likely take place once the natives from Phase I have fully grown as to avoid competition for sunlight.

Personally, I feel that small changes often have the biggest rewards, even amidst such a vast ecosystem and within a complex web of interdependence. Meaning, although all I did was take out a dozen “toxic” bushes and replace them with three healthy ones, I believe that my backyard will already feel the benefits, come spring. Within page 93 of his book, Tallamy describes biodiversity as “one of this country’s richest assets” and I agree; we are squandering and suffocating a great gift. I strongly feel that if each of my neighbors was to re-evaluate their lawns, gardens, and woody areas, and take a serious look into what toxicity blooms there each year, we could start a collaborative effort to bring our yards back to the healthy, diverse ecosystem they once were.



Got any more sticks for me to chew, Alyssa?

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